CALCULUS
MIDTERM #1 (practice exam)

name: _____
email: _____

1. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to\infty} \dfrac{2x^3-3x^2+x-2}{3x^2+2x+1}$

2. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to\infty} \dfrac{-x^2+x+2}{-3x^3-3x^2+2x}$

3. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to\infty} \dfrac{-2x^3+x^2+x}{-x^2-x+3}$

4. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to-\frac{1}{3}} \dfrac{-9x^2+3x+2}{6x^2-4x-2}$

5. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to-1} \dfrac{4x^2+2x-2}{-2x-2}$

6. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to\frac{2}{3}} \dfrac{9x^2-15x+6}{6x^2+2x-4}$

7. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to\infty} \left((3-x)-\sqrt{x^2-5x+11}\right)$

8. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to\infty} \left(-\sqrt{3x+5}-2\right)$

9. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to\infty} \left(-\sqrt{x+10}-3\right)$

10. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to0} \dfrac{\sin(4x)}{\sin(3x)}$

11. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to0} \dfrac{\sin(8x)}{x}$

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12. **SHOW ALL work/reasoning:**
Find the limit (or state "DNE"): $\lim_{x\to 0} \frac{\sin(7x)}{\sin(6x)}$

13. **SHOW ALL work/reasoning:**
Find $\frac{dy}{dx}$ given: $2xy^2-xy+2y^2-y=2$

14. **SHOW ALL work/reasoning:**
Find $\frac{dy}{dx}$ given: $xy^2-y^2=2x+2$

15. **SHOW ALL work/reasoning:**
Find $\frac{dy}{dx}$ given: $-4xy^2-2xy+4y^2+2y=2x-2$

16. **SHOW ALL work/reasoning:**
Find $\frac{dy}{dx}$ given: $x\ln(xy)=-1-x$

17. **SHOW ALL work/reasoning:**
Find $\frac{dy}{dx}$ given: $\cos(3x+5y)=2x$

18. **SHOW ALL work/reasoning:**
Find $\frac{dy}{dx}$ given: $\sin(xy)=-1-x$

19. **SHOW ALL work/reasoning:**
Find $\frac{d^2y}{dx^2}$ given: $y=\cos(3x+5y)$

20. **SHOW ALL work/reasoning:**
Find $\frac{d^2y}{dx^2}$ given: $y=\ln(2x)$

21. **SHOW ALL work/reasoning:**
Find $\frac{d^2y}{dx^2}$ given: $y=x^3\sin(x)$

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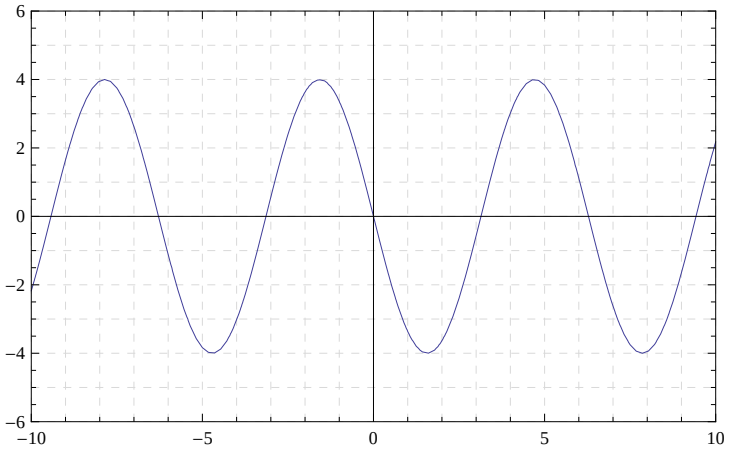
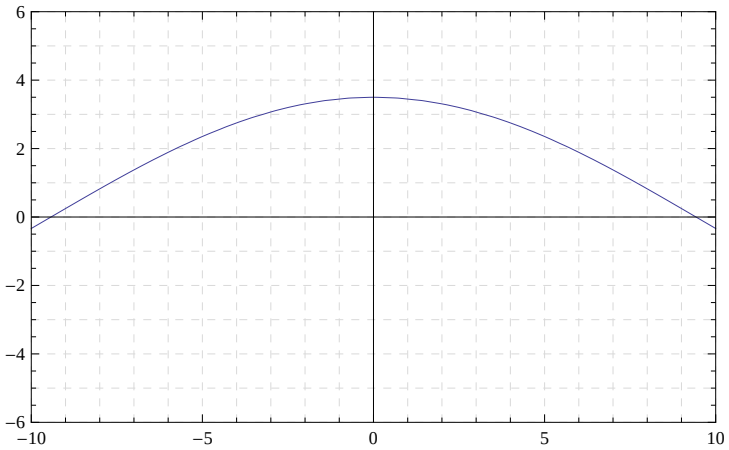
22. **SHOW ALL work/reasoning:**

Find the slope of the line tangent to the curve of the function at the point $x = \frac{\pi}{6}$:
$y = -4\sin(x)$



23. **SHOW ALL work/reasoning:**

Find the slope of the line tangent to the curve of the function at the point $x = 0$:
$y = 3.5\cos\left(\frac{x}{6}\right)$



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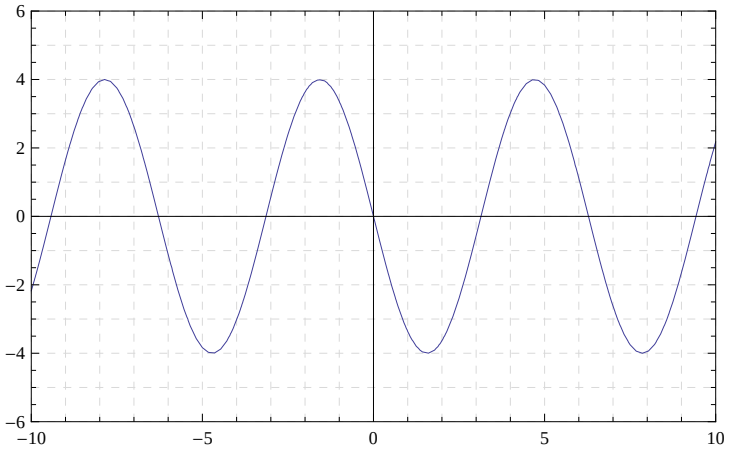
24. **SHOW ALL work/reasoning:**

Find the slope of the line tangent to the curve of the function at the point $x = \frac{\pi}{2}$:
$y = -4\sin(x)$



25. **SHOW ALL work/reasoning:**

Use the derivative definition [either one] to demonstrate that if $f(x) = \sin(x)$ then:

$$\left.\frac{df}{dx}\right|_{x=c} = \cos(c)$$

26. **SHOW ALL work/reasoning:**

Use the derivative definition [either one] to demonstrate that if $f(x) = x^3$ then:

$$\left.\frac{df}{dx}\right|_{x=c} = 3c^2$$

27. **SHOW ALL work/reasoning:**

Use the derivative definition [either one] to demonstrate that if $f(x) = \sin(2x)$ then:

$$\left.\frac{df}{dx}\right|_{x=c} = 2\cos(2c)$$

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