

Answers to Dr. Z's Three Practice Tests For The First Midterm Exam

(Version of Oct. 12, 2008, three corrections and I5(b) added (thanks to Ashwin for pointing them out!))

Answers to Practice Exam 1.

- (a) $\frac{5}{2}$ (b) DNE (c) 4 (d) 1
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$$\frac{dy}{dx} = -\frac{3x^2y + 3y^2 + y^5}{x^3 + 6xy + 5xy^4}.$$

- (a) The solution is an argument (no numerical answer) (b) The solution is an argument (no numerical answer), but the punch-line is that one should take $\delta = \epsilon/5$
- The points are $(-1, -1)$ and $(1, 1)$, and the equations of the tangent lines are $y = 5x + 4$ and $y = 5x - 4$ respectively.
- (a) $-2 \sin x^2 - 4x^2 \cos x^2 + 12x^2$ (b) $-4, -10, -12$, backwards, speeding up.
- Answers are graphs.
- $a = 4, b = -3$.
- (a) 0 (b) -6 (c) 74 (d) 8.

Answers to Practice Exam 2.

- $\frac{-1}{(x+1)^2}$ (but you had to do it using the definition!)
- $y = -\frac{1}{11}x - \frac{10}{11}$ (or $x + 11y + 10 = 0$)
- (a) 8, forward. (b) $t = -1$ (c) 19
- (a) $\frac{3x^4 - 15x^2 - 12x}{(3x^2 - 5)^2}$ (b) $-x^2 \sin x + 2x \cos x + 6x + e^x$
(c) $\frac{13e^x}{(5+e^x)^2}$ (d) $(2x + 3x^4)e^x$.
- (a) 18 (b) -22 (c) 50 (d) 3
- (a) $-\frac{4}{5}$ (b) 6 (c) $\frac{63}{\pi^2}$ (d) 0
- (a) (i) 13 (ii) 13 (iii) 13 (iv) 1 (v) 16 (vi) DNE (b) $x = 1$
- (a) $(x-1)^{1/3}$ (b) $\frac{1}{x} - 5$ (c) $x^2 - 6$

Answers to Practice Exam 3.

- -1 (but you had to do it the long way).
- (a) $100 + 10t - \frac{1}{2}gt^2$ (b) $10 - gt$ (c) $120 - 2g, 10 - 2g, -g$.
- (a) The solution is an argument (no numerical answer), but the punch-line is that one should take $\delta = \epsilon/100$
(b) The solution is an argument (no numerical answer), using IVT.
- (a) $\frac{(3x+4)\cos x - 3\sin x}{(3x+4)^2}$ (b) $\cos 3x - 3x \sin 3x$ (c) $\frac{(6x^3 - 4x)e^{x^2}}{(1+3x^2)^2}$
- $y = 13x - 7$
- $\frac{dy}{dt} = -\frac{3y+4x^3}{3y^2+3x} \frac{dx}{dt}$
- $(-\sqrt{\frac{24}{13}}, 2\sqrt{\frac{24}{13}}), (\sqrt{\frac{24}{13}}, -2\sqrt{\frac{24}{13}})$.
- $y = \frac{\sqrt{2}}{2}x + 1 + \frac{\sqrt{2}}{2} - \frac{\sqrt{2}\pi}{8}$.