Exam I Hints and Answers
Math 124 Spring 2010
Version Alpha

1. (3 points each) (a) $\frac{1}{2}$ (b) ∞ (c) i. 0 ii. $\frac{1}{9}$

2. (3 points each)

   (a) $s'(t) = \dfrac{(t+7t^{3/2})(\sec^2 t) - (\tan t)\left(1+\frac{21}{2}t^{1/2}\right)}{(t+7t^{3/2})^2}$

   (b) $\dfrac{dy}{dx} = e^{3x}\cos x + (\sin x)(e^{3x})(3)$

   (c) $f'(x) = 100\left(\dfrac{3x-1}{2x+5}\right)^{99}\left[\dfrac{(2x+5)(3)-(3x-1)(2)}{(2x+5)^2}\right]$

   (d) $g'(\theta) = 5\cos(\theta) + \sin(\theta^2)\cdot 2\theta$

3. (a) (3 points) $x = 2$

   (b) (3 points) $y - 67 = 16(x-10)$ or $y = 16x - 93$

   (c) (4 points) HINT: The line in question goes through the points (a, a^2-4a+7) and $(0,0)$. So its slope is $m = \dfrac{a^2-4a+7-0}{a-0}$. But this line is also tangent to $f(x)$ at $x = a$, which means its slope is also equal to $f'(a) = 2a-4$. Set the two expressions for the slope equal to each other and solve for a.
   ANSWER: $a = \pm\sqrt{7}$

4. HINT: The coordinates of P are $\left(1, \frac{5\sqrt{3}}{2}\right)$ and the coordinates of Q are $\left(1+h, \sqrt{25-\frac{25}{4}(1+h)^2}\right)$.
   ANSWER: $s(h) = \dfrac{\sqrt{25-\frac{25}{4}(1+h)^2} - \frac{5\sqrt{3}}{2}}{h}$

5. (2 points each)

   (a) $y = 0$ and $y = 3$

   (b) $x = -5$ and $x = 2$

   (c) -5 and 2

   (d) -5, 0, and 2

   (e) III