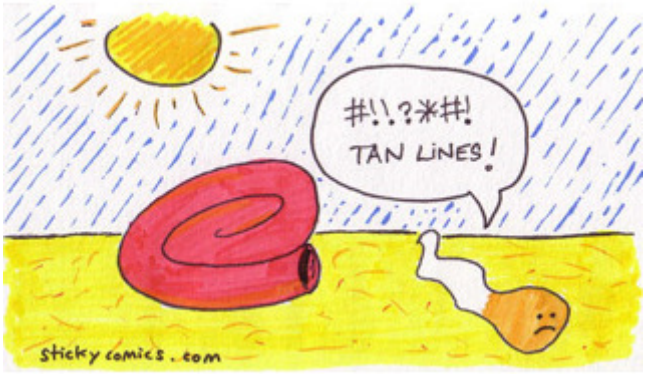

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1. *Find the equation of the tangent line to the curve* $x^2 + y^2 = 169$ *at the point* $(5, -12)$

2. *Find the equation of the tangent line to the curve* $f(x) = \sqrt{3\sin x + 9}$ *at* $x = 0$

3. *Let* f *be the function given by* $f(x) = \tan x$ *and let* $g(x) = x^2$. *At what value of* x *in the interval* $0 \le x \le \pi$ *do the graphs of* f *and* g *have parallel tangent lines? [Calculator permitted for this question]*

4.. *Consider the differential equation* $\frac{dy}{dx} = \frac{x}{y}$ *where* $y \neq 0$. *Write the equation of the tangent line to the solution curve that passes through the point* $(3, -1)$ *and use it to approximate* $f(2.9)$

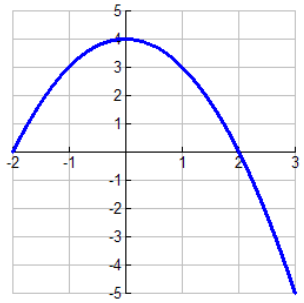
5. *Consider the curve* $x^2 + y^2 = 25$ *for* $y \ge 0$

(a) *Find* $\frac{dy}{dx}$

(b) *Write the equation of the tangent line to the curve at* $x = 3$

(c) *Find the point on the curve where the tangent line is horizontal.*

6. *The graph of* $f(x) = 4 - x^2$ *on the closed interval* $[-2, 3]$ *is shown below.*



(a) *Draw in the secant line from* $x = -2$ *to* $x = 3$ *and find the equation of the secant line [the average rate of change]*

(b) *Find the value of* c, $-2 < c < 3$, *that is guaranteed by the Mean Value Theorem. [First write the MVT statement] Then draw in the appropriate tangent line and find the tangent line equation.*

7. *Let* f *be the function given by* $f(x) = x^3 - 6x^2 + 7x + 3$. *Write the equation of the tangent line to the graph at* $x = 4$ *and use it to approximate* $f(4.2)$

8. *2009AB5 [non-calculator]*

x	2	3	5	8	13
$f(x)$	1	4	–2	3	6

. Let f be a function that is twice differentiable for all real numbers. The table above gives values of f for selected points in the closed interval $2 \le x \le 13$.

(a) Estimate $f'(4)$. Show the work that leads to your answer.

(d) Suppose $f'(5) = 3$ and $f''(x) < 0$ for all x in the closed interval $5 \le x \le 8$. Use the line tangent to the graph of f at $x = 5$ to show that $f(7) \le 4$. Use the secant line for the graph of f on $5 \le x \le 8$ to show that $f(7) \ge \frac{4}{3}$.

9. *2008AB4 [non-calculator]*

. The functions f and g are given by $f(x) = \int_0^{3x} \sqrt{4 + t^2}\, dt$ and $g(x) = f(\sin x)$.

(a) Find $f'(x)$ and $g'(x)$.

(b) Write an equation for the line tangent to the graph of $y = g(x)$ at $x = \pi$.